



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/719,487	11/20/2003	Juan A. Coronado	TUC920030140US1	2512
49080 7590 11/06/2009 DALE F. REGELMAN QUARLES & BRADY, LLP ONE SOUTH CHURCH AVENUE, STE. 1700 TUCSON, AZ 85701-1621				
EXAMINER KEEHN, RICHARD G				
ART UNIT 2456		PAPER NUMBER		
NOTIFICATION DATE 11/06/2009		DELIVERY MODE ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

reena.mendez@quarles.com
pat-dept@quarles.com

Office Action Summary

Application No.

10/719,487

Applicant(s)

CORONADO ET AL.

Examiner

RICHARD G. KEEHN

Art Unit

2456

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 July 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 July 2009 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

1. Claims 1-30 have been examined and are pending.
2. Claim amendments are not persuasive. Accordingly, this Office action is made FINAL.

Response to Arguments

3. Applicant's arguments, see page 22, filed 7/30/2009, with respect to the drawings have been fully considered but are not persuasive. The substance of element 305 has been corrected, but Figure 3B referenced on figure 3A is still not submitted (missing).
4. Applicant's arguments, see page 22, filed 7/30/2009, with respect to objection of the specification have been fully considered and are persuasive. The objection of the specification has been withdrawn.
5. Applicant's arguments, see page 23, filed 7/30/2009, with respect to the rejection of Claims 1, 11 and 21 under 35 U.S.C. 112 first and second paragraphs have been fully considered and are persuasive. The rejection of Claims 1, 11 and 21 under 35 U.S.C. 112 first and second paragraphs has been withdrawn.
6. Applicant's prior art arguments filed 7/30/2009 have been fully considered but they are not persuasive:
 - a. Applicant argues that the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. does not disclose "formatting (N) host computer groups, wherein (N) is greater than or equal to 1, wherein at least one host computer group comprises two or more host computers." (Emphasis added by

Examiner). Yet the very next limitation recites “assigning each of said [[plurality of]] three host computers to a host computer group.” If “three” or even a “plurality of” (as previously presented) host computers are assigned to a host computer group, then it is explicitly and expressly clear “wherein at least one host computer group comprises two or more host computers.” Therefore, this amended claim language does nothing to further limit what had already been claimed and rejected in the previous Office action. Therefore Applicant’s argument is unpersuasive; and

b. Applicant argues that the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. does not disclose “receiving a request from a host computer assigned to an (i)th host computer group to establish a copy service relationship between a source logical volume and a target logical volume, **wherein the source logical volume is disposed in a first information storage and retrieval system and the target logical volume is disposed in a second information storage and retrieval system.**” (Emphasis added by Examiner) All that the amended claim language indicates is that the source and target logical volumes are in separate “storage and retrieval systems.” Hewlett-Packard discloses separate physical volumes. These separate physical volumes are storage and retrieval systems, hence Hewlett-Packard discloses the amended claim language. Therefore Applicant’s argument is unpersuasive; and

- c. Applicant's arguments with respect to dependent claims point toward dependency on independent claim arguments, which are not persuasive.

Therefore Applicant's arguments on dependent claims are also not persuasive.

Drawings

7. The drawings are objected to because Figure 3A references Figure 3B, and Figure 3B has not been submitted. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 1-4, 11-14 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over non-patent literature dated March 21, 1995 entitled "HP-UX 10.0 Logical Volume Manager White Paper" (Hewlett-Packard), and further in view of US 2003/0188188 A1 (Padmanabhan et al.) and US 2003/0041211 A1 (Merkey et al.).

As to Claims 1, 11 and 21, Hewlett-Packard discloses a method, an article of manufacture comprising a computer useable medium having computer readable program code, and a computer program product encoded in an information storage medium and usable with a programmable computer processor (hereby referred to as "the system") to control access to logical volumes disposed in one or more information storage and retrieval systems using copy service relationships, comprising the steps of:

providing a first information storage and retrieval system comprising a plurality of first logical volumes (Hewlett-Packard – Page 5 recites mirroring wherein separate first and second and third logical volumes are paired to create a copy of one another);

providing a second information storage and retrieval system comprising a plurality of second logical volumes (Hewlett-Packard – Page 5 recites mirroring wherein separate first and second and third logical volumes are paired to create a copy of one another);

providing three host computers (Hewlett-Packard – Page 5 recites the Physical Volume Group of separate computers {plurality not necessarily limited to three} connected via I/O channels or interface adapters. One of ordinary skill in the art at the time the invention was made would have been motivated to provide three hosts for improved reliability, uptime, facilitating maintenance without downtime, and fault recovery);

forming (N) host computer groups, wherein (N) is greater than or equal to 1, wherein at least one host computer group comprises two or more host computers (Hewlett-Packard – Page 5 recites the Physical Volume Group of separate computers connected via I/O channels or interface adapters);

assigning each of said three host computers to the a host computer group (Hewlett-Packard – Page 5 recites the Physical Volume Group of separate computers connected via I/O channels or interface adapters);

forming (N) logical volume groups (Hewlett-Packard – Page 6 recites the Logical Volume Group);

assigning one or more of said plurality of first logical volumes to a logical volume group (Claims 11 and 21 only, omitted from Claim 1 by Applicant) (Hewlett-Packard – Page 5 recites the Physical Volume Group of separate computers connected via I/O channels or interface adapters);

receiving a request from a host computer assigned to the (i)th host computer group to establish a copy service relationship between a source logical volume and a target logical volume, wherein said source logical volume is disposed in said first

information storage and retrieval system and said target logical volume is disposed in said second information storage and retrieval system (Hewlett-Packard – page 21 recites the “lvmerge” and “lvcreate” commands used to create mirrored logical volume relationships; Hewlett-Packard – Page 5 recites the Physical Volume Group of separate computers connected via I/O channels or interface adapters);

determining if said source logical volume is assigned to the (i)th logical volume group (Hewlett-Packard – page 21 recites the “lvdisplay” command used to retrieve information about logical volumes);

operative if said target logical volume is assigned to the (i)th logical volume group, determining if said second logical volume is assigned to the (i)th logical volume group (Hewlett-Packard – page 21 recites the “lvdisplay” command used to retrieve information about logical volumes including mirrored status information);

operative if both the source logical volume and the target logical volume are assigned to the (i)th logical volume group, establishing said copy service relationship (Hewlett-Packard – Page 5 recites mirroring wherein logical volumes in the same mirror grouping are placed into a copy relationship).

Hewlett-Packard does not disclose, but Padmanabhan et al. disclose wherein each of said plurality of host computers assigned to an (i)th host computer group is not assigned to any other of the (N) host computer groups, and wherein each of said logical volumes assigned to an (i)th logical volume group is not assigned to any other of the (N) logical volume groups, and wherein a host computer assigned to an (i)th host computer group has access rights to logical volumes assigned

to an (i)th logical volume group, wherein (i) is greater than or equal to 1 and less than or equal to (N) (Padmanabhan et al. – Figure 2, elements 50 recite host computers which contain their own logical volumes grouped into a logical grouping via the border server 230; which are separate and distinct from element 150 PC's logically connected to the grouping controlled by border server 231. The host computer (PC) groups and their associated volume groups are not assigned to each other. The (N) host computer groups are those assigned to each of the external non-trusted servers. The (N) logical volume groups are those associated and connected to the aforementioned (N) host computers, hence the host computers have access rights to their own volumes within their group. ¶ [0035] also recites that this network configuration can be used with mirroring).

The combination of Hewlett-Packard and Padmanabhan et al. does not disclose two clusters, wherein a remote I/O bridge interconnects said two clusters, and wherein each cluster comprises a processor, a cache, a plurality of host adapters, a plurality of device adapters, a plurality of disk drive arrays each utilizing a Redundant Array of Independent Disks protocol; and does not disclose providing a storage area network ("SAN"), wherein said SAN is in communication with a first host computer via a first plurality of communication links, in communication with a second host computer via a second plurality of communication links, in communication with a third host computer via a third plurality of communication links, in communication with said first information storage and retrieval system via a fourth plurality of communication links, and in

communication with said second information storage and retrieval system via a fifth plurality of communication links, but Merkey et al. disclose

two clusters (Merkey et al. disclose clusters – Page 4, ¶ [0085] and Figure 4c depicts two clusters: elements 450-454 and elements 460-464), wherein a remote I/O bridge interconnects said two clusters (Merkey et al. discloses the remote I/O bridge – Page 5, ¶ [0094] and Page 6, ¶ [0098]) , and wherein each cluster comprises a processor (Merkey et al. disclose a processor – Page 1, ¶ [0015]), a cache (Merkey et al. disclose cache – Page 4, ¶ [0085]), a plurality of host adapters (Merkey et al. disclose host adapters – Page 6, ¶ [0101]), a plurality of device adapters (Merkey et al. disclose device adapters – Page 3, ¶ [0076] and Page 5, ¶ [0096]), a plurality of disk drive arrays each utilizing a Redundant Array of Independent Disks protocol (Merkey et al. disclose RAID disk drives arrays – Page 4, ¶ [0085]); and

two clusters (Merkey et al. disclose the clusters – Page 4, ¶ [0085] and Figure 4c depicts two clusters: elements 450-454 and elements 460-464), wherein a remote I/O bridge interconnects said two clusters (Merkey et al. discloses the remote I/O bridge – Page 5, ¶ [0094] and Page 6, ¶ [0098]) , and wherein each cluster comprises a processor (Merkey et al. disclose a processor – Page 1, ¶ [0015]), a cache (Merkey et al. disclose cache – Page 4, ¶ [0085]), a plurality of host adapters (Merkey et al. disclose host adapters – Page 6, ¶ [0101]), a plurality of device adapters (Merkey et al. disclose device adapters – Page 3, ¶ [0076] and Page 5, ¶ [0096]), a plurality of disk drive arrays each utilizing a Redundant Array of Independent Disks protocol (Merkey et al. disclose RAID disk drives arrays – Page 4, ¶ [0085]); and

providing a storage area network ("SAN"), wherein said SAN is in communication with a first host computer via a first plurality of communication links, in communication with a second host computer via a second plurality of communication links, in communication with a third host computer via a third plurality of communication links, in communication with said first information storage and retrieval system via a fourth plurality of communication links, and wherein said first information storage and retrieval system is in communication with said second information storage and retrieval system via a fifth plurality of communication links (Merkey et al. disclose storage area network interfaces in RAID systems connecting host systems to storage systems – Page 5, ¶ [0095]. It would have been obvious, and was obvious as disclosed by implementation in this reference, to use storage area network configuration to provide high bandwidth, low latency data transfers of block based memory between those RNS systems and their local caches, without the copying overhead typical of LAN based storage - ¶ [0095]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine wherein each of said plurality of host computers assigned to an (i)th host computer group is not assigned to any other of the (N) host computer groups, and wherein each of said logical volumes assigned to an (i)th logical volume group is not assigned to any other of the (N) logical volume groups, and wherein a host computer assigned to an (i)th host computer group has access rights to logical volumes assigned to an (i)th logical volume group, wherein (i) is greater than or equal to 1 and less than or equal to (N) taught by Padmanabhan et al., with forming (N) host computer groups, wherein (N) is greater than or equal to 1; assigning each of said

plurality of host computers to the a host computer group; forming (N) logical volume groups; and assigning one or more of said plurality of first logical volumes to a logical volume group taught by Hewlett-Packard.

One of ordinary skill in the art at the time the invention was made would have been motivated to structure network architecture to provide fairness of content distribution and reduce network congestion in mirrored and shared resource applications (Padmanabhan - ¶¶ [0011-0013 and 0035]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine two clusters, wherein a remote I/O bridge interconnects said two clusters, and wherein each cluster comprises a processor, a cache, a plurality of host adapters, a plurality of device adapters, a plurality of disk drive arrays each utilizing a Redundant Array of Independent Disks protocol; and providing a storage area network ("SAN"), wherein said SAN is in communication with a first host computer via a first plurality of communication links, in communication with a second host computer via a second plurality of communication links, in communication with a third host computer via a third plurality of communication links, in communication with said first information storage and retrieval system via a fourth plurality of communication links, and in communication with said second information storage and retrieval system via a fifth plurality of communication links taught by Merkey et al., with the system to control access to logical volumes disposed in one or more information storage and retrieval systems using copy service relationships taught by the combination of Hewlett-Packard

and Padmanabhan et al., in order to add high speed and fault tolerance (Merkey et al. – Page 1, ¶ [0003]).

As to Claims 2, 12 and 22, the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. discloses the system of claims 1, 11 and 21 respectively, further comprising the steps of:

receiving a request to revise access rights to one or more of said plurality of first logical volumes or one or more of said plurality of second logical volumes (Hewlett-Packard, Page 21 recites the “lvcreate” and “lvchange” commands which revise, inter alia, mirroring functions);

determining if said request comprises assigning to one of said (N) logical volume groups a logical volume in a copy relationship (Hewlett-Packard – Page 21 recites the creation of logical volumes into a copy arrangement);

operative if said request comprises assigning to one of said (N) logical volume groups a logical volume in a copy relationship, denying said request (Hewlett-Packard – Page 5 recites the Quorum requirement wherein at least 50% of the mirrored volume disks must be present to change the volume group. Page 2 recites that up to 3 volumes can be mirrored. Hence if a request to change 1 of 3 mirrored volumes is presented, the quorum requirement will not be met and the request will be denied).

As to Claims 3, 13 and 23, the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. discloses the system of claims 1, 11 and 21 respectively, further comprising the steps of:

receiving a request to revise access rights to one or more of said plurality of first logical volumes (Hewlett-Packard, Page 21 recites the "lvsplit" command which unassigns the volumes from a mirrored relationship);

determining if said request comprises unassigning one of said first logical volumes in a copy relationship (Hewlett-Packard, Page 21 recites the "lvsplit" command which unassigns the volumes from a mirrored relationship);

operative if said request comprises unassigning one of said first logical volumes in a copy service relationship, wherein said copy service relationship comprises a copy session, determining whether to complete said copy session and then terminate the copy service relationship (Hewlett-Packard – Page 5 recites the Quorum requirement wherein at least 50% of the mirrored volume disks must be present to change the volume group);

operative if said request comprises unassigning one of said first logical volumes in a copy service relationship and if said copy session is to be completed prior to terminating said copy service relationship (Hewlett-Packard - Page 20 recites the synchronous mode. If running in this mode, the file system activity must complete before the process is allowed to continue. Therefore, if running in synchronous mode and an lvsplit command is issued, copy in progress would complete before terminating

the mirror relationship and unassigning the mirrored volumes from their mirrored relationship):

completing said copy session (Hewlett-Packard - Page 20 recites the synchronous mode. If running in this mode, the file system activity must complete before the process is allowed to continue. Therefore, if running in synchronous mode and an lvsplit command is issued, copy in progress would complete before terminating the mirror relationship and unassigning the mirrored volumes from their mirrored relationship);

terminating said copy service relationship (Hewlett-Packard - Page 20 recites the synchronous mode. If running in this mode, the file system activity must complete before the process is allowed to continue. Therefore, if running in synchronous mode and an lvsplit command is issued, copy in progress would complete before terminating the mirror relationship and unassigning the mirrored volumes from their mirrored relationship); and

unassigning said one of said first logical volumes (Hewlett-Packard - Page 20 recites the synchronous mode. If running in this mode, the file system activity must complete before the process is allowed to continue. Therefore, if running in synchronous mode and an lvsplit command is issued, copy in progress would complete before terminating the mirror relationship and unassigning the mirrored volumes from their mirrored relationship).

As to Claims 4, 14 and 24, the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. discloses the system of claims 3, 13 and 23 respectively, further comprising the steps of:

operative if said request comprises unassigning one of said first logical volumes but does not comprise un assigning one of said first logical volumes in a copy service relationship, unassigning said one of said first logical volumes (Hewlett-Packard – Page 17 recites the “vgexport” command which unassigns a logical volume. This works on volumes whether mirrored or not);

operative if said request comprises unassigning one of said first logical volumes in a copy service relationship and if said copy service relationship is not to be terminated denying the request to unassign said one of said first logical volumes (Hewlett-Packard – Page 5 recites the Quorum requirement wherein at least 50% of the mirrored volume disks must be present to change the volume group);

operative if said copy session will not be completed prior to terminating said copy service relationship:

terminating said copy service relationship prior to completing said copy session (Hewlett-Packard – Page 18 recites the system crash recovery wherein a volume fails, the mirroring is disabled and data is backed up on one of the previously mirrored volumes. Reassignment of the mirrored relationship occurs after the physical problem has been resolved); and

unassigning said one of said first logical volumes (Hewlett-Packard – Page 18 recites the system crash recovery wherein a volume fails, the mirroring is disabled and

data is backed up on one of the previously mirrored volumes. Reassignment of the mirrored relationship occurs after the physical problem has been resolved).

9. Claims 5-7, 15-17 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. as applied to claims 1, 11 and 21 above, and further in view of US 6,145,066 (Atkin).

As to Claims 5, 15 and 25, the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. discloses the system of claims 1, 11 and 21 respectively, further comprising the steps of:

providing a configuration interface interconnected to said first information storage and retrieval system (Hewlett-Packard – Page 21 recites the System management commands to perform LVM configuration operations);

operative if said copy service relationship comprises a [*mirroring*] relationship, determining if said request was provided by said configuration interface (Hewlett-Packard – Page 21 recites the "lvcreate" instruction which can be used to create a copy relationship. If the command is given, it executes the copy relationship. If the command is not given, no relationship is made at that time);

operative if said copy service relationship comprises a [*mirroring*] relationship, determining if said request was provided by said configuration interface (Hewlett-Packard – Page 21 recites the "lvcreate" instruction which can be used to create a copy

relationship. If the command is given, it is determined to have been received by the configuration interface, and it executes the copy relationship. If the command is not given, no relationship is made at that time);

operative if said request was provided by said configuration interface (Hewlett-Packard – Page 21 recites the “lvcreate” instruction which can be used to create a copy relationship. If the command is given, it is determined to have been received by the configuration interface, and it executes the copy relationship. If the command is not given, no relationship is made at that time),

establishing the [mirroring] relationship (Hewlett-Packard – Page 21 recites the “lvcreate” instruction which can be used to create a copy relationship. If the command is given, it is determined to have been received by the configuration interface, and it executes the copy relationship. If the command is not given, no relationship is made at that time);

operative if said request was not provided by said configuration interface, not establishing the requested [mirroring] relationship (Hewlett-Packard – Page 21 recites the “lvcreate” instruction which can be used to create a copy relationship. If the command is given, it is determined to have been received by the configuration interface, and it executes the copy relationship. If the command is not given, no relationship is made at that time).

The combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. does not disclose, but Atkin discloses determining if said copy service relationship comprises a peer-to-peer remote copy (“PPRC”) relationship (Atkin – Column 3, lines

47-64 recite the use of the Peer-to-Peer Remote Copy feature); and the PPRC relationship (Atkin - Column 3, lines 47-64 recite the use of the Peer-to-Peer Remote Copy feature).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine PPRC taught by Atkin, with the mirroring relationship taught by the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al.

One of ordinary skill in the art at the time the invention was made would have been motivated to add migration facility to the copy feature (Atkin – Column 4, lines 4-11).

As to Claims 6, 16 and 26, the combination of Hewlett-Packard, Padmanabhan et al., Merkey et al. and Atkin discloses the system of claims 5, 15 and 25 respectively, further comprising the steps of:

receiving a termination request to terminate said [mirroring] relationship (Hewlett-Packard – Page 21 recites the "lvsplit" command which terminates the mirroring relationship);

determining if said termination request was provided by said configuration interface (Hewlett-Packard – Page 21 recites the "lvsplit" instruction which can be used to terminate a copy relationship. If the command is given, it executes the termination of a copy relationship. If the command is not given, no relationship termination is made at that time);

operative if said termination request was provided by said configuration interface, terminating the [*mirroring*] relationship (Hewlett-Packard – Page 21 recites the “lvsplit” instruction which can be used to terminate a copy relationship. If the command is given, it executes the termination of a copy relationship. If the command is not given, no relationship termination is made at that time);

operative if said termination request was not provided by said configuration interface, denying the request to terminate the [*mirroring*] relationship (Hewlett-Packard – Page 21 recites the “lvsplit” instruction which can be used to terminate a copy relationship. If the command is given, it executes the termination of a copy relationship. If the command is not given, no relationship termination is made at that time).

The combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. does not disclose, but Atkin discloses an invention substantially as claimed, including PPRC relationship (Atkin - Column 3, lines 47-64 recite the use of the Peer-to-Peer Remote Copy feature).

The motivation and obviousness arguments are the same as in Claim 5.

As to Claims 7, 17 and 27, the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. discloses the system of claims 1, 11 and 21.

The combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. does not disclose, but Atkin discloses an invention substantially as claimed, including further comprising the steps of:

determining if said requested copy service relationship comprises an extended remote copy ("XRC") relationship (Atkin - Column 3, lines 7-21 recite the use of XRC);

operative if said requested copy service relationship comprises an XRC relationship, denying said request to establish said XRC relationship (Atkin - Column 3, lines 45-61 recite the choice of PPRC over XRC).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the exclusion of XRC taught by Atkin, with the mirroring relationship taught by the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al.

One of ordinary skill in the art at the time the invention was made would have been motivated to avoid using a copy scheme that is complex to use and operationally expensive and resource intensive (Atkin - Column 3, lines 45-46).

10. Claims 8, 18 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. as applied to claims 1, 11 and 21 above, and further in view of US 2002/0069369 A1 (Tremain).

As to Claims 8, 18 and 28, the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. discloses the system of claims 1, 11 and 21 respectively, further comprising the steps of:

providing a configuration interface interconnected with said first information storage and retrieval system (Hewlett-Packard – Page 21 recites the System management commands to perform LVM configuration operations);

operative if said copy service relationship comprises a [*mirroring*] relationship, determining if said request was provided by said configuration interface (Hewlett-Packard – Page 21 recites the “lvcreate” instruction which can be used to create a copy relationship. If the command is given, it executes the copy relationship. If the command is not given, no relationship is made at that time);

operative if said request was provided by said configuration interface, establishing the requested [*mirroring*] relationship (Hewlett-Packard – Page 21 recites the “lvcreate” instruction which can be used to create a copy relationship. If the command is given, it is determined to have been received by the configuration interface, and it executes the copy relationship. If the command is not given, no relationship is made at that time);

operative if said request was not provided by said configuration interface, denying the request to establish a [*mirroring*] relationship (Hewlett-Packard – Page 21 recites the “lvcreate” instruction which can be used to create a copy relationship. If the command is given, it is determined to have been received by the configuration interface, and it executes the copy relationship. If the command is not given, no relationship is made at that time).

The combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. does not disclose, but Tremain discloses determining if said copy service relationship

comprises a remote FlashCopy relationship (Tremain - ¶ [0187] recites the use of Flashcopy facilities); and the remote FlashCopy relationship (Tremain - ¶ [0187] recites the use of Flashcopy facilities).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Flashcopy taught by Tremain, with the mirroring relationship taught by the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al.

One of ordinary skill in the art at the time the invention was made would have been motivated to provide customers with available virtual machine environments (Tremain - ¶ [0187]).

11. Claims 9-10, 19-20 and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. as applied to claims 1, 11 and 21 above, and further in view of US 6,735,636 B1 (Mokryn et al.).

As to Claims 9, 19 and 29, the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. discloses the system of claims 1, 11 and 21 respectively, further comprising the steps of:

determining if said requested copy service relationship comprises adding a new source logical volume and/or a new target logical volume to an existing [*mirroring*]

session comprising an existing logical volume group (Hewlett-Packard – Page 21 recites the “lvextend” command which adds physical extents allocated to a logical volume, hence the logical size changes as well. If the command is given, the volume is extended. If the command is not given, then volume is not extended);

operative if said requested copy service relationship comprises adding a new source logical volume or a new target logical volume to an existing [mirroring] session, determining if said new source logical volume and/or said new target logical volume are assigned to said existing logical volume group (Hewlett-Packard – Page 21 recites the “lvextend” command targeted to a specific volume. The Logical Volume Manager (Page 5) knows whether the volume belongs to a volume group);

operative if said new source logical volume and/or said new target logical volume are assigned to said existing logical volume group, adding said new source logical volume and/or said new target logical volume to said existing [mirroring] session (Hewlett-Packard – Page 21 recites the “lvextend” command which adds physical extents allocated to a logical volume, hence the logical size changes as well. If the command is given, the volume is extended. If the command is not given, then volume is not extended).

The combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. does not disclose, but Mokryn et al. disclose Concurrent Copy relationship (Mokryn et al. – Column 2, lines 41-49 recite using Concurrent Copy for mirroring).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Concurrent Copy taught by Mokryn et al., with the

mirroring copy system taught by the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al.

One of ordinary skill in the art at the time the invention was made would have been motivated to apply commercially available mirroring methods (Mokryn et al. – Column 2, lines 41-49).

As to Claims 10, 20 and 30, the combination of Hewlett-Packard, Padmanabhan et al., Merkey et al. and Mokryn et al. disclose the system of claims 9, 19 and 29 respectively, further comprising the step of:

operative if said new source logical volume and/or said new target logical volume are not assigned to said existing logical volume group, not adding said new source logical volume and/or said new target logical volume to said existing [*mirroring*] session (Hewlett-Packard – Page 21 recites the “lvextend” command which adds physical extents allocated to a logical volume, hence the logical size changes as well. If the command is given, the volume is extended. If the command is not given, then volume is not extended).

Hewlett-Packard does not disclose, but Mokryn et al. discloses Concurrent Copy relationship (Mokryn et al. – Column 2, lines 41-49 recite using Concurrent Copy for mirroring).

The motivation and obviousness arguments are the same as in Claim 9.

Examiner Notes

12. Examiner notices that the claims do not reflect some of the specific details of elements found in Figure 1 as described on pages 13-14 of the specification. Inclusion in independent form and in sufficient detail may help to overcome the cited prior art used in this Office action.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **RICHARD G. KEEHN** whose telephone number is (571)270-5007. The examiner can normally be reached on Monday through Thursday, 8am - 6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bunjob Jaroenchonwanit can be reached on 571-272-3913. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RGK

/Bunjob Jaroenchonwanit/
Supervisory Patent Examiner, Art Unit 2456